REMARKS

The application contains claims 1-19. Claims 1, 2, 5, 6, 13 and 17 have been amended. In view of the foregoing amendments and following remarks, Applicants respectfully request allowance of the application.

At the outset, Applicants thank the Examiner for the thorough analysis of his 38 page Office Action. The Office Action contains several helpful suggestions to facilitate prosecution of the application and many have been adopted.

SPECIFICATION AND CLAIM OBJECTIONS

The specification is objected to due to a minor informality. The specification is amended to address this minor informality. Accordingly, Applicants request the objection be reconsidered and withdrawn.

Claims 2 and 5 are objected to due to minor informalities. Claims 2 and 5 are amended to address these minor informalities. Accordingly, Applicants request the objections be reconsidered and withdrawn.

SECTION 112, FIRST PARAGRAPH REJECTIONS

Applicants respectfully request withdrawal of the outstanding enablement rejections to claims 1-19. The Examiner objects essentially to the claims' discussion of estimating a constellation size. First, the Examiner argues that Krishnamoorthy and Isaksson refer to constellation size in some sense and, therefore, these descriptions somehow define terms in the pending claims. Second, the Examiner argues that Applicant's technology does not work. Applicants respectfully suggest that the specification's discussion is clear, complete and correct. The specification fully enables the claimed subject matter.

Sec. 112, first paragraph, requires that the specification provide a written description that permits one skilled in the art to make and use the invention. Applicants have no obligation to describe the inventions of Krishnamoorthy or Isaksson. If the Examiner chooses to maintain the written description rejections, Applicants respectfully request the Examiner provide his

interpretation of the pending claim language and justify the interpretation with reference to Applicants' own specification, not the patents of others. When the pending claims are considered against the specification of this application, it becomes clear that the claims satisfy all requirements of section 112.

The specification describes a constellation as a set of unique values that may be assigned to data symbols (see paragraph 6). FIG. 3 provides six exemplary constellations that may be useful in various communication systems. The specification further states that the location of received constellation points is the product of the location of transmitted constellation points and the channel gain (see paragraph 64). Channel gain alters the size of a constellation at a receiver. If channel gain is ½ (power of a received signal is 50% of the transmitted power), the received data points would be observed having a constellation size that is different than if channel gain were 1/10 (10% of transmitted power). Using the QAM constellation of FIG. 3(e) as an example, the number of constellation points remains the same in both examples – there still are 16 constellation points available – but the size of the constellation, the magnitude of the data points away from the I- and Q-axes, would differ based on different channel gains. The specification describes this phenomenon in detail.

Although the Examiner challenges it, the specification describes a methodology that estimates channel gain. The Examiner asserts that a receiver must know the shortest distance between constellation points to determine the constellation size. This is incorrect. As the specification explains, the system uses reliable symbols – those set of received symbols that are estimated as being likely to occur in their correct decision region notwithstanding ISI effects. From this set of reliable symbols, the system identifies the ones that are the largest (the maximally sized reliable symbols). These symbols are taken as defining the outer extent of the channel gain. From the outer edges of the constellation, it is possible to estimate the intermediate constellation points (see, generally, paragraphs 63-72). The specification provides a comprehensive, enabling discussion of the claimed subject matter. Accordingly, the § 112, first paragraph rejections should be withdrawn.

SECTION 112, SECOND PARAGRAPH REJECTIONS

Claims 1 and 13 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention.

Claim 1 is amended to more clearly define the scope of the invention recited in claim 1. Accordingly, Applicants request the rejection of claim 1 be reconsidered and withdrawn.

Claim 13 is amended to define variables "K_1" and "K_2." Accordingly, Applicants request the rejection of claim 13 be reconsidered and withdrawn.

SECTION 101 REJECTIONS

Claims 1-19 stand rejected as failing to define statutory subject matter. Independent claims 1, 6, 13 and 17 are amended to clearly define an invention having utility within the technological arts. Accordingly, Applicants respectfully request withdrawal of all outstanding § 101 rejections.

SECTION 103 REJECTIONS

Summary of Hassan (U.S.P. 5,901,185) reference

Hassan discloses the generation of "information symbol estimates based on an iteratively generated transfer characteristic estimate," as illustrated in FIG. 10 (col. 9, lines 55-57). As shown in FIG. 10, a "first estimate of the transfer function is generated from . . . the predetermined pilot symbol symbols" (col. 9, lines 58-60). A first group of information symbols is then estimated "based on the first estimate of the transfer characteristic" (col. 9, line 66). A subsequent "estimate [of the transfer characteristic] is then generated from the pilot symbol data, the information symbol data and the [first] information symbol estimates" (col. 10, lines 3-5). In this way, "information symbol estimates are generated using an iterative estimation of the transfer characteristic, in which each succeeding estimate . . . is augmented by previous estimates of information symbols" (col. 10, lines 10-14). Accordingly, Hassan is not directed to the identification of reliable symbols nor to the estimation of constellation size using reliable symbols.

Summary of Isaksson et al. (U.S.P. 6,438,174) reference

Isaksson et al. discloses a multi-carrier transmission system in which "a suitable constellation (bit-loading) is determined for each carrier" using a parameter "indicative of a deviation of a received signal from a corresponding constellation point" (col. 2, lines 25-26 and lines 37-39, respectively). The constellation selected for a carrier is changed if the parameter is outside an upper and lower limit. As disclosed by Isaksson et al., the 'parameter' "may be a ratio d^2/σ^2, where d is the shortest distance between neighbouring [points of a particular constellation], σ is a standard deviation, and σ^2 is the variance of the deviations of the input and output signal values of [a] symbol detection unit" (col. 2, lines 45-49). Further, Isaksson et al. reveals that the variance is "a measure of the disturbance on the carrier and [is] directly related to SNR" and that a "specific maximum symbol error rate . . . gives a minimum ratio d/σ" (col. 2, lines 61-62 and lines 56-57, respectively). Isaksson et al. therefore teaches adjusting the bit-loading of a carrier by determining symbol error rate from an estimated SNR. Accordingly, Isaksson et al. is not directed to the identification of reliable symbols nor to the estimation of constellation size using reliable symbols.

Claims 1-5 Define Over the Cited Art.

Claim 1 is not obvious over Jasper et al., Hassan and Abdelilah et al.

Claim 1 stands rejected over Jasper et al. (U.S.P. 5,553,102) in view of Hassan (U.S.P. 5,901,185) and in further view of Abdelilah et al. (U.S.P. 6,661,837). Applicants respectfully request withdrawal of this rejection. Amended claim 1, for example, recites:

> ***identifying reliable symbols*** from a sequence of captured data samples recovered from a communication channel;
> ***estimating a constellation size*** from a set of ***maximally-sized reliable symbols***; and
> ***estimating a gain*** of the communication channel ***based on the estimated constellation size***

None of the references cited by the Examiner, either alone or in combination, teach this subject matter. For example, Hassan does not teach identifying reliable symbols as alleged by the Examiner. As discussed above, Hassan is directed to the inclusion of information symbol

data for generating a new estimate of a transfer characteristic. As such, Hassan does not identify 'reliable symbols' as claimed.

Neither Jasper et al. nor Abdelilah et al. cure the deficiency of Hassan. Jasper et al. discloses a diversity reception communication system. Abdelilah et al. discloses a communication system that adjusts a data rate based on determined error signals. Neither reference discloses identifying 'reliable symbols' as claimed. Accordingly, Applicants respectfully submit that claim 1 defines over the cited art and the rejection should be withdrawn.

Claims 2-5 depend, either directly or indirectly, from independent claim 1 and are allowable for at least the reasons applicable to claim 1, as well as due to the features recited therein.

Claims 6-12 and 17-19 Define Over the Cited Art.

Claims 6 and 17 are not obvious over Hassan and Isaksson et al.

Claims 6 and 17 stand rejected over Hassan (U.S.P. 5,901,185) in view of Isaksson et al. (U.S.P. 6,438,174). Applicants respectfully request withdrawal of these rejections. Amended claims 6 and 17, for example, recite:

Claim 6: ***A reliable symbol identification method*** comprising:

> ***calculating a reliability factor*** of a candidate sample from constellation points nearest to each of a plurality of other samples in proximity to the candidate sample, wherein the candidate sample and the plurality of other samples represent a data signal recovered from a communication channel,
>
> if the reliability factor is less than a predetermined limit, designating the candidate sample as a reliable symbol.

Claim 17: ***A method of identifying reliable symbols***, comprising, for a candidate sample recovered from a communication channel,

> ***determining whether any of a plurality of constellation points is within a predetermined threshold***, each of the plurality of constellation points associated with samples neighboring the candidate sample also recovered from the communication channel,
>
> if none of the constellation points exceed the threshold, designating the candidate sample as a reliable symbol.

Neither reference cited by the Examiner, either alone or in combination, teaches the subject matter of claim 6 or 17. For example, Hassan does not teach identifying reliable symbols as alleged by the Examiner. As discussed above, Hassan is directed to the inclusion of information symbol data for generating a new estimate of a transfer characteristic. As such, Hassan does not identify 'reliable symbols' as claimed.

Isaksson et al. does not cure the deficiency of Hassan. As discussed above, Isaksson et al. teaches adjusting the bit-loading of a carrier by determining symbol error rate from an estimated SNR. Isaksson et al. does not teach identifying 'reliable symbols' as claimed above. Accordingly, Applicants respectfully submit that claims 6 and 17 define over the cited art and the rejections should be withdrawn.

Claims 7-12 depend from independent claim 6 and are allowable for at least the reasons applicable to claim 6, as well as due to the features recited therein.

Claims 18 and 19 depend from independent claim 17 and are allowable for at least the reasons applicable to claim 17, as well as due to the features recited therein.

Claims 13-16 Define Over the Cited Art.

Claim 13 is not obvious over Hassan, Isaksson et al. and Abdelilah et al.

Claim 13 stands rejected over Hassan (U.S.P. 5,901,185) in view of Isaksson et al. (U.S.P. 6,438,174) and in further view of Abdelilah et al. (U.S.P. 6,661,837). Applicants respectfully request withdrawal of this rejection.

None of the references cited by the Examiner, either alone or in combination, teach the subject matter of claim 13. For example, Hassan does not teach identifying reliable symbols as alleged by the Examiner. As discussed above, Hassan is directed to the inclusion of information symbol data for generating a new estimate of a transfer characteristic. As such, Hassan does not identify 'reliable symbols' as claimed.

Neither Isaksson et al. nor Abdelilah et al. cure the deficiency of Hassan. Isaksson et al. adjusts the bit-loading of a carrier by determining symbol error rate from an estimated SNR.

Abdelilah et al. discloses a communication system that adjusts a data rate based on determined error signals. Neither reference discloses identifying 'reliable symbols' as claimed. Accordingly, Applicants respectfully submit that claim 13 defines over the cited art and the rejection should be withdrawn.

Claims 14-16 depend from independent claim 13 and are allowable for at least the reasons applicable to claim 13, as well as due to the features recited therein.

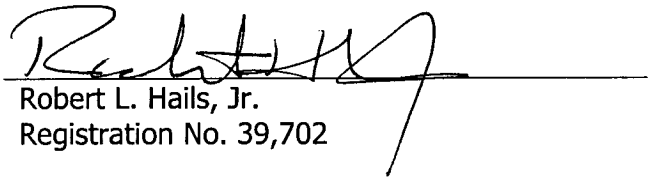
CONCLUSION

Applicants respectfully submit that all claims are allowable over the cited art. Allowance is solicited.

The Office is hereby authorized to charge any additional fees or credit any overpayments under 37 C.F.R. 1.16 or 1.17 to Kenyon & Kenyon Deposit Account No. 11-0600. The Examiner is invited to contact the undersigned at (202) 220-4235 to discuss any matter concerning this application.

Respectfully submitted,

Date: January 23, 2006



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